

NON-CATALOG

Frequency Synthesizer

DSN-1500A-1119+

50Ω 1100 to 1500 MHz

The Big Deal

- Low phase noise and spurious
- Robust design and construction



CASE STYLE: KL942

Product Overview

The DSN-1500A-1119+ is a Frequency Synthesizer, designed to operate from 1100 to 1500 MHz for Point-to-Point application. The DSN-1500A-1119+ is packaged in a metal case (size of 1.25" x 1.00" x 0.20") to shield against unwanted signals and noise.

Key Features

Feature	Advantages
Low phase noise and spurious: <ul style="list-style-type: none">• Phase Noise: -93 dBc/Hz typ. @ 10 kHz offset• Comparison Spurious: -93 dBc typ.• Reference Spurious: -112 dBc typ.	Low phase noise and spurious improve system EVM (Error Vector Magnitude).
Robust design and construction	To enhance the robustness of DSN-1500A-1119+, each internal component is secured to the substrate with chip bonder, thereby eliminating the risk of tombstoning during subsequent solder reflow operations by the customer.



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50Ω 1100 to 1500 MHz

Features

- Integrated VCO + PLL
- Low phase noise and spurious
- Robust design and construction
- Low operating voltage (VCC VCO=+5V, VCC PLL=+12.5V)



CASE STYLE: KL942

+ RoHS compliant in accordance with EU Directive (2002/95/EC)

The +Suffix has been added in order to identify RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications.

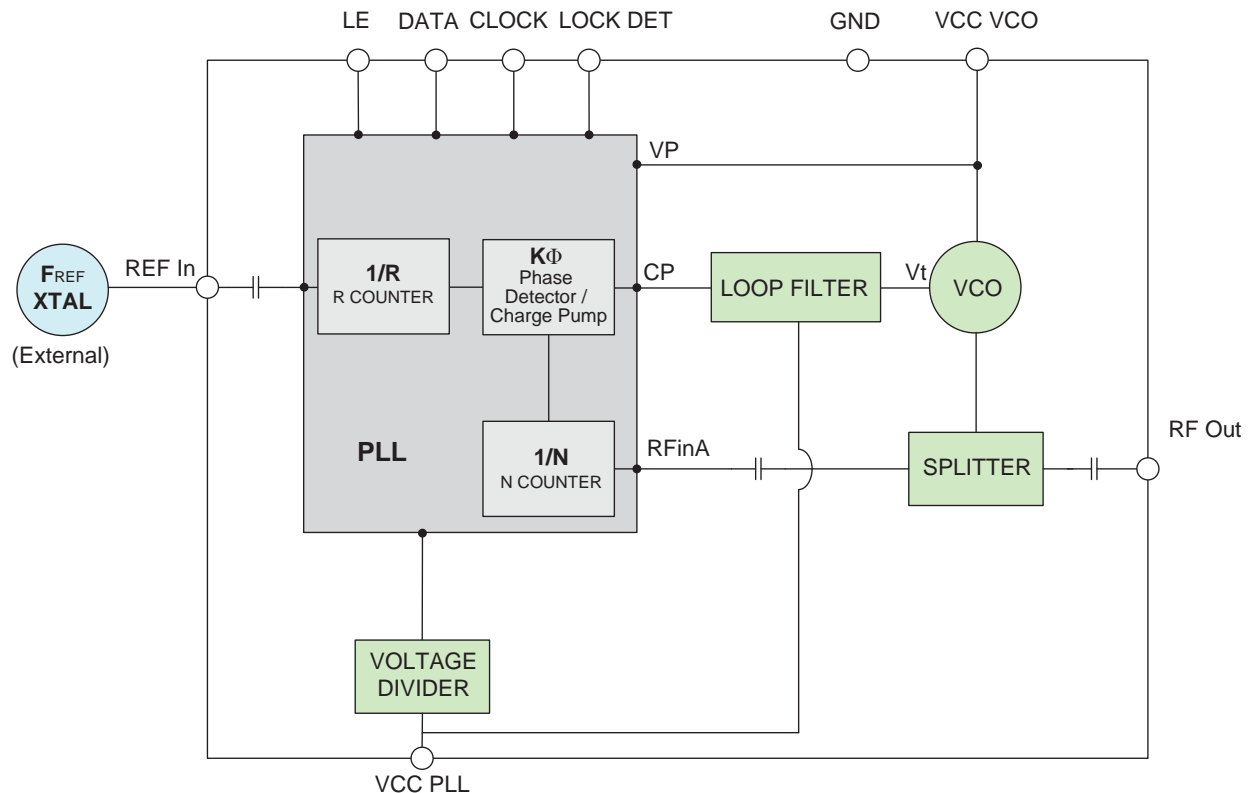
Applications

- Point-to-Point

General Description

The DSN-1500A-1119+ is a Frequency Synthesizer, designed to operate from 1100 to 1500 MHz for Point-to-Point application. The DSN-1500A-1119+ is packaged in a metal case (size of 1.25" x 1.00" x 0.20") to shield against unwanted signals and noise. To enhance the robustness of DSN-1500A-1119+, each internal component is secured to the substrate with chip bonder, thereby eliminating the risk of tombstoning during subsequent solder reflow operations by the customer.

Simplified Schematic



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REV. A
M149087
EDR-7028/8F1
DSN-1500A-1119+
Category-D6
RAV
150101
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Electrical Specifications *(over operating temperature -33°C to +80°C)*

Parameters	Test Conditions	Min.	Typ.	Max.	Units		
Frequency Range	-	1100	-	1500	MHz		
Step Size	-	-	500	-	kHz		
Settling Time	Within ± 1 kHz	-	30	-	mSec		
Output Power	-	+2.5	+5.5	+7.5	dBm		
SSB Phase Noise	@ 100 Hz offset	-	-71	-	dBc/Hz		
	@ 1 kHz offset	-	-75	-65			
	@ 10 kHz offset	-	-93	-87			
	@ 100 kHz offset	-	-116	-110			
	@ 1 MHz offset	-	-140	-135			
Reference Spurious Suppression	Ref. Freq. 10 MHz	-	-112	-95	dBc		
Comparison Spurious Suppression	Step Size 500 kHz	-	-93	-78			
Non - Harmonic Spurious Suppression	-	-	-90	-			
Harmonic Suppression	-	-	-28	-10			
VCO Supply Voltage	+5.00	+4.75	+5.00	+5.25	V		
PLL Supply Voltage	+12.50	+12.25	+12.50	+12.75			
VCO Supply Current	-	-	36	43	mA		
PLL Supply Current	-	-	14	21			
Reference Input (External)	Frequency	10 (square wave) ensure slew rate (SR) > 50 V/ μ s		-	10	-	MHz
	Amplitude	1	-	-	1	-	V _{P-P}
	Input impedance	-	-	-	100	-	K Ω
	Phase Noise @ 1 kHz offset	-	-	-	-140	-	dBc/Hz
RF Output port Impedance	-	-	50	-	-	Ω	
Input Logic Level	Input high voltage	-	2.65	-	-	-	V
	Input low voltage	-	-	-	0.65	-	V
Digital Lock Detect	Locked	-	2.85	-	3.70	-	V
	Unlocked	-	-	-	0.40	-	V
Frequency Synthesizer PLL	-	ADF4106					
PLL Programming	-	3-wire serial 3.3V CMOS					
Register Map @ 1500 MHz	F_Register	-	(MSB) 100111111000000000010010 (LSB)				
	N_Register	-	(MSB) 1000000101110101100001 (LSB)				
	R_Register	-	(MSB) 100000000000001010000 (LSB)				

Absolute Maximum Ratings

Parameters	Ratings
VCO Supply Voltage	5.8V
PLL Supply Voltage	14.0V
VCO Supply Voltage to PLL Supply Voltage	N.A.
Reference Frequency Voltage	0Vmin, +3.55Vmax
Data, Clock, LE Levels	0Vmin, +3.55Vmax
Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +100°C

Permanent damage may occur if any of these limits are exceeded



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Frequency Synthesizer

DSN-1500A-1119+

Typical Performance Data

FREQUENCY (MHz)	POWER OUTPUT (dBm)			VCO CURRENT (mA)			PLL CURENT (mA)		
	-38°C	+25°C	+85°C	-38°C	+25°C	+85°C	-38°C	+25°C	+85°C
	1100	5.19	5.70	5.54	33.58	36.30	37.90	11.84	13.53
1124	5.20	5.65	5.45	33.68	36.37	37.95	11.81	13.52	15.32
1168	5.40	5.77	5.45	33.85	36.47	38.01	11.80	13.51	15.32
1212	5.72	5.97	5.57	33.98	36.55	38.06	11.85	13.56	15.37
1256	5.57	5.75	5.30	34.14	36.65	38.11	11.84	13.55	15.36
1300	5.96	6.07	5.53	34.18	36.65	38.08	11.83	13.55	15.35
1344	5.73	5.74	5.15	34.25	36.67	38.05	11.82	13.53	15.33
1388	5.97	5.88	5.21	34.17	36.57	37.96	11.87	13.58	15.38
1432	5.66	5.48	4.75	34.14	36.50	37.89	11.85	13.56	15.37
1476	5.52	5.24	4.50	34.00	36.37	37.80	11.84	13.55	15.35
1500	5.34	5.07	4.30	33.93	36.30	37.75	11.86	13.57	15.37

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-38°C	+25°C	+85°C	-38°C	+25°C	+85°C
1100	-15.62	-19.89	-27.30	-20.31	-23.41	-28.92
1124	-16.71	-20.94	-28.50	-21.64	-25.15	-31.60
1168	-17.95	-23.05	-31.58	-24.48	-29.05	-35.98
1212	-19.42	-25.18	-34.34	-27.45	-32.92	-38.92
1256	-21.75	-28.70	-35.79	-31.51	-38.12	-41.29
1300	-25.15	-33.14	-35.79	-35.66	-42.52	-44.16
1344	-27.34	-33.39	-33.80	-37.53	-45.80	-47.97
1388	-31.61	-34.05	-33.83	-40.48	-49.08	-49.17
1432	-31.31	-33.36	-33.99	-44.97	-55.54	-50.83
1476	-31.34	-32.76	-33.76	-55.38	-56.35	-51.75
1500	-29.85	-31.55	-32.99	-48.67	-65.20	-55.54



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FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS				
	+25°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1100	-78.02	-80.25	-96.34	-118.99	-139.04
1124	-76.67	-80.75	-95.79	-118.86	-140.84
1168	-74.44	-77.25	-94.77	-117.78	-141.53
1212	-69.93	-74.66	-93.64	-116.68	-141.18
1256	-70.04	-73.75	-92.89	-115.65	-140.52
1300	-69.62	-72.83	-92.27	-114.77	-139.84
1344	-68.88	-71.72	-91.84	-114.46	-139.66
1388	-66.44	-71.67	-91.55	-114.32	-139.20
1432	-62.96	-70.49	-91.60	-114.62	-139.55
1476	-66.69	-70.37	-92.25	-114.99	-139.88
1500	-69.84	-70.98	-92.57	-115.23	-140.24

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS				
	-38°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1100	-80.54	-83.12	-99.67	-121.55	-138.88
1124	-79.43	-83.28	-99.75	-121.99	-138.86
1168	-77.12	-82.90	-99.73	-122.20	-140.10
1212	-76.17	-80.88	-99.36	-122.12	-141.87
1256	-76.01	-79.37	-98.00	-120.91	-143.27
1300	-73.38	-76.30	-96.25	-119.34	-143.37
1344	-73.54	-74.22	-95.16	-118.14	-143.06
1388	-72.44	-74.96	-94.26	-117.16	-142.15
1432	-69.94	-72.85	-94.31	-116.85	-142.04
1476	-70.41	-73.12	-94.23	-117.11	-142.17
1500	-70.38	-73.29	-94.54	-117.19	-142.39

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @OFFSETS				
	+85°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1100	-69.36	-75.68	-91.86	-115.23	-138.94
1124	-69.03	-74.85	-91.79	-115.17	-139.01
1168	-68.81	-73.60	-91.06	-114.80	-139.00
1212	-68.25	-73.30	-90.67	-114.31	-138.73
1256	-67.67	-71.02	-90.44	-114.00	-138.69
1300	-65.29	-71.98	-90.52	-113.78	-138.43
1344	-68.28	-70.21	-90.58	-114.11	-138.41
1388	-67.14	-69.96	-90.34	-114.17	-138.68
1432	-66.96	-70.88	-90.73	-114.63	-139.05
1476	-68.83	-71.68	-91.42	-115.12	-139.40
1500	-67.43	-71.76	-91.79	-115.31	-139.57



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Frequency Synthesizer

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COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @Fcarrier 1100MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 1300MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @Fcarrier 1500MHz+(n*Fcomparison) (dBc) note 1			
	n	-38°C	+25°C	+85°C	-38°C	+25°C	+85°C	-38°C	+25°C	+85°C
	-5	-106.29	-108.47	-130.80	-115.42	-130.62	-115.91	-128.08	-126.91	-128.73
-4	-104.20	-106.75	-125.39	-115.44	-127.83	-114.60	-126.15	-125.60	-125.75	
-3	-101.33	-104.51	-122.77	-114.12	-125.79	-113.39	-124.96	-123.55	-123.62	
-2	-99.18	-99.65	-108.02	-113.33	-114.21	-109.27	-115.38	-121.75	-119.58	
-1	-92.75	-93.59	-95.28	-99.84	-102.83	-102.02	-100.00	-109.46	-113.84	
0 ^{note 2}	-	-	-	-	-	-	-	-	-	
+1	-92.78	-93.21	-95.48	-99.65	-102.61	-102.44	-99.36	-108.67	-113.82	
+2	-99.23	-99.56	-108.71	-114.23	-113.84	-111.83	-114.37	-122.87	-115.50	
+3	-101.75	-104.55	-122.19	-114.55	-120.56	-114.64	-123.60	-126.86	-119.42	
+4	-103.84	-106.11	-121.70	-114.56	-125.45	-119.27	-130.38	-128.60	-121.25	
+5	-105.86	-108.79	-129.11	-115.34	-125.04	-118.99	-130.82	-130.12	-126.82	

Note 1: Comparison frequency 500 kHz

Note 2: All spurs are referenced to carrier signal (n=0).

REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @Fcarrier 1100MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 1300MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @Fcarrier 1500MHz+(n*Freference) (dBc) note 3			
	n	-38°C	+25°C	+85°C	-38°C	+25°C	+85°C	-38°C	+25°C	+85°C
	-5	-124.36	-125.18	-122.57	-126.29	-127.25	-125.52	-127.43	-126.88	-128.38
-4	-122.57	-131.25	-123.52	-132.35	-126.89	-129.88	-131.48	-121.79	-126.31	
-3	-127.74	-117.89	-118.37	-119.62	-117.86	-119.14	-120.22	-120.25	-119.62	
-2	-120.50	-129.18	-131.26	-129.81	-125.39	-129.13	-129.72	-120.56	-129.00	
-1	-111.96	-110.79	-112.45	-112.16	-112.18	-110.14	-113.54	-112.96	-112.75	
0 ^{note 4}	-	-	-	-	-	-	-	-	-	
+1	-112.93	-114.52	-112.88	-117.36	-117.96	-112.72	-116.40	-116.64	-116.95	
+2	-123.95	-125.59	-129.51	-134.63	-130.08	-119.57	-123.88	-122.35	-121.49	
+3	-131.10	-117.83	-121.74	-127.73	-119.11	-119.92	-130.45	-123.54	-128.25	
+4	-132.27	-128.68	-132.05	-124.46	-126.65	-131.59	-124.59	-129.80	-122.25	
+5	-124.90	-124.61	-124.43	-122.73	-123.54	-133.84	-123.23	-124.90	-133.36	

Note 3: Reference frequency 10 MHz

Note 4: All spurs are referenced to carrier signal (n=0).



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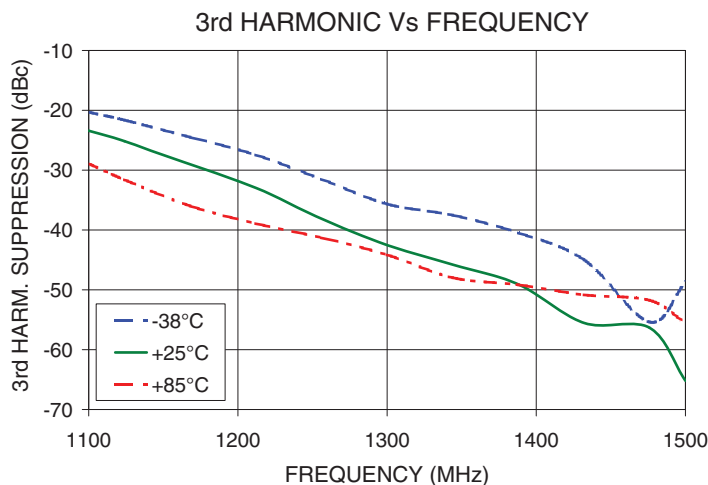
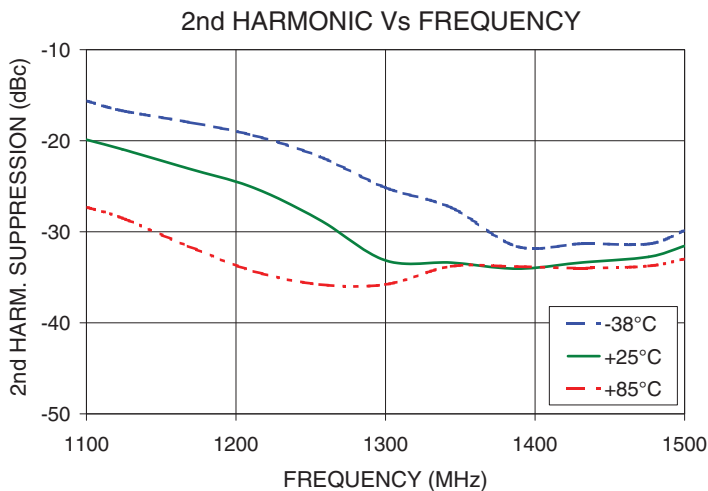
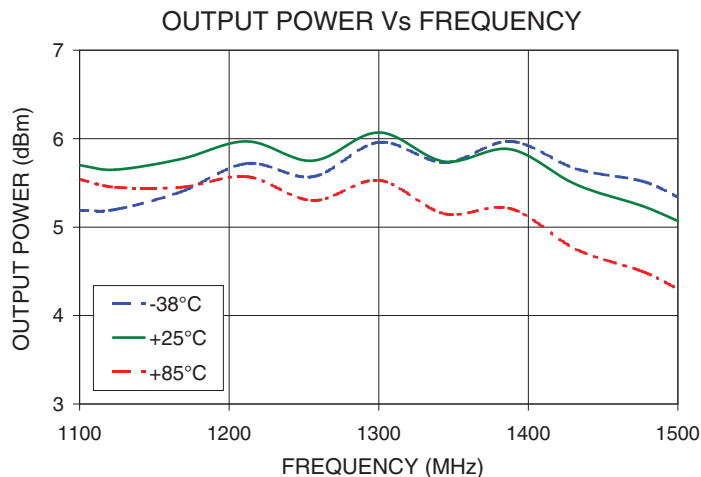


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Typical Performance Curves



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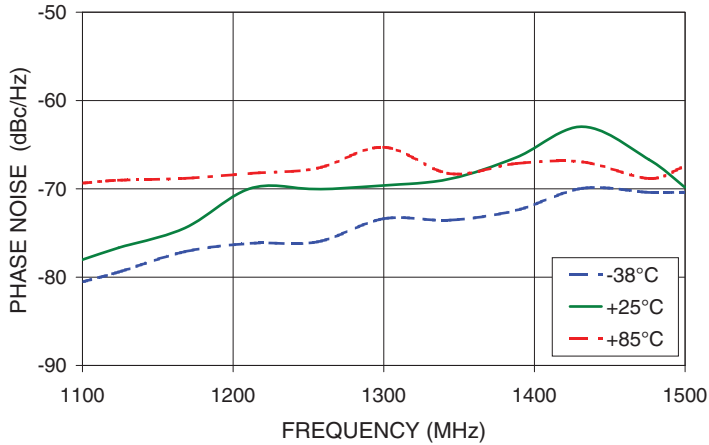
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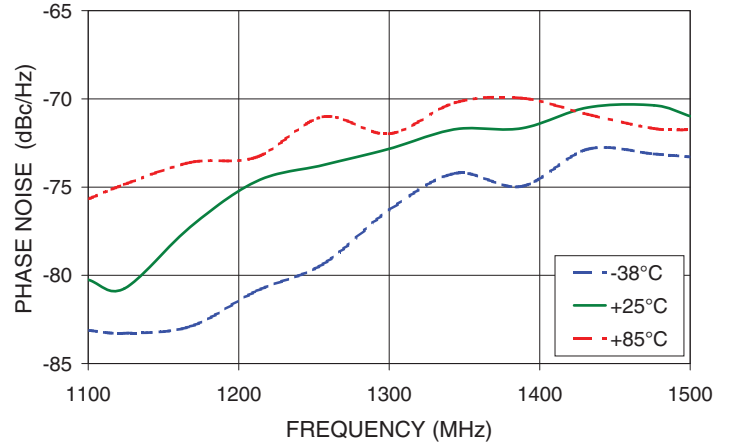
Frequency Synthesizer

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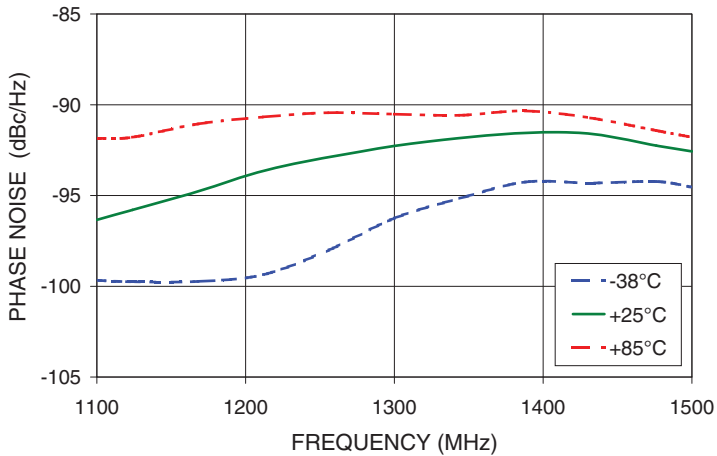
PHASE NOISE @ 100Hz offset



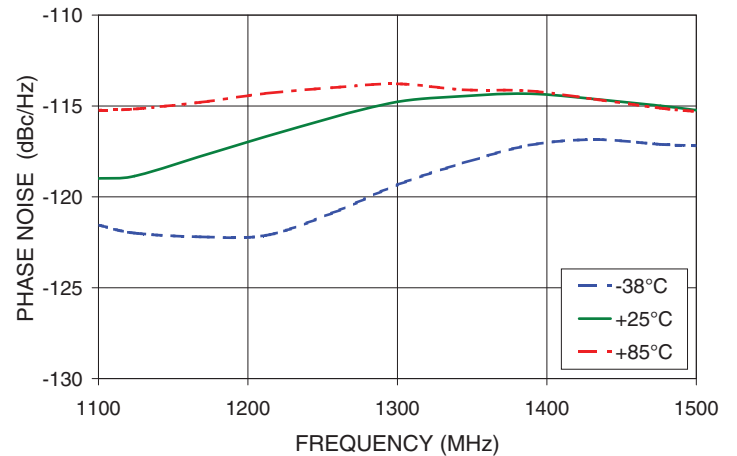
PHASE NOISE @ 1kHz offset



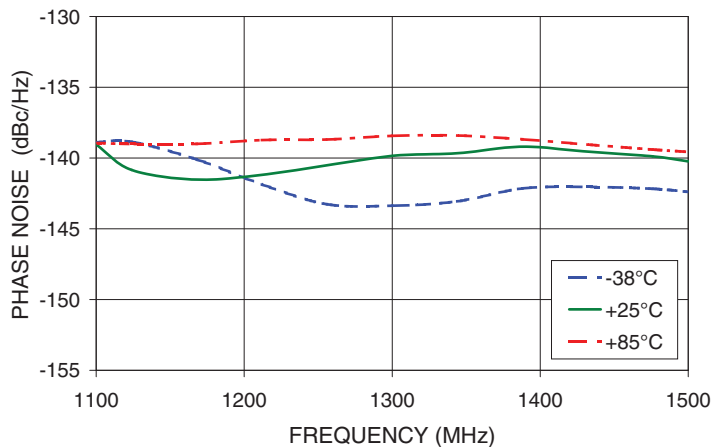
PHASE NOISE @ 10kHz offset



PHASE NOISE @ 100kHz offset



PHASE NOISE @ 1MHz offset



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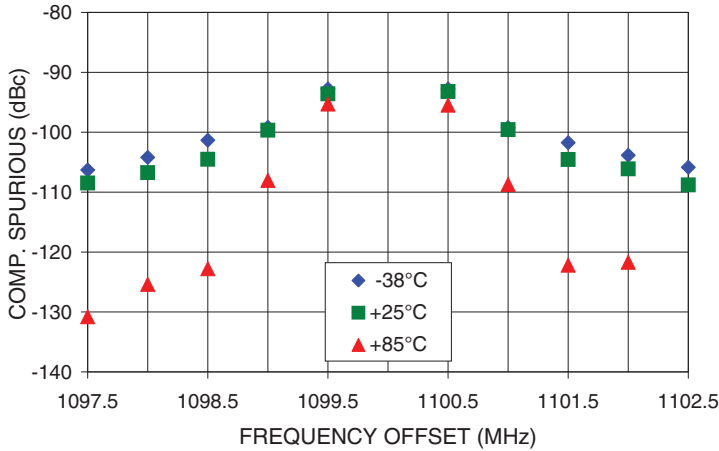


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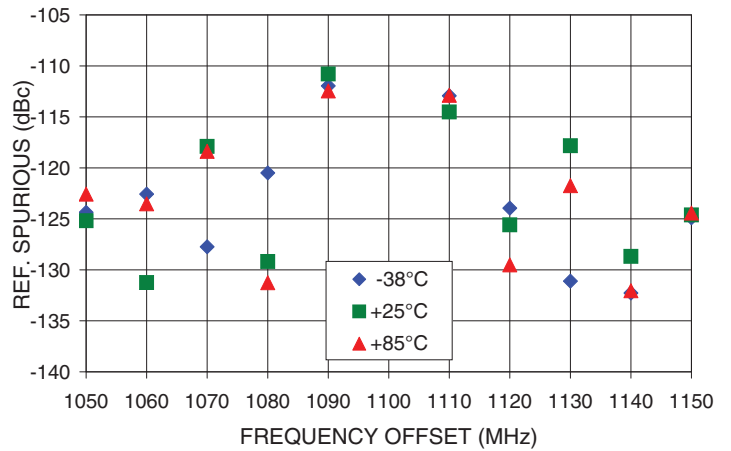


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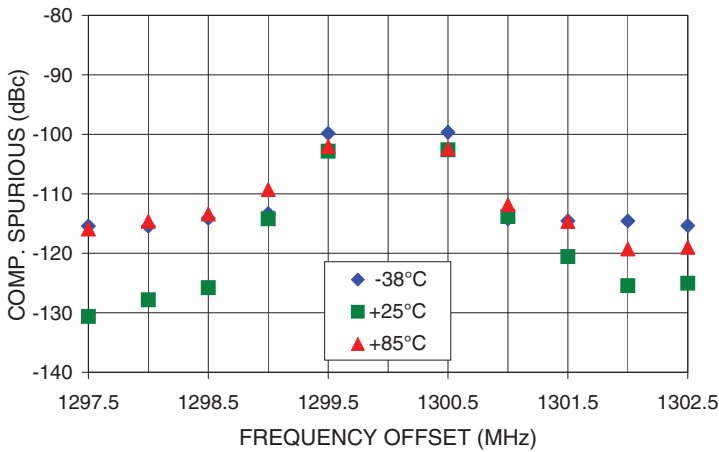
COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1100MHz



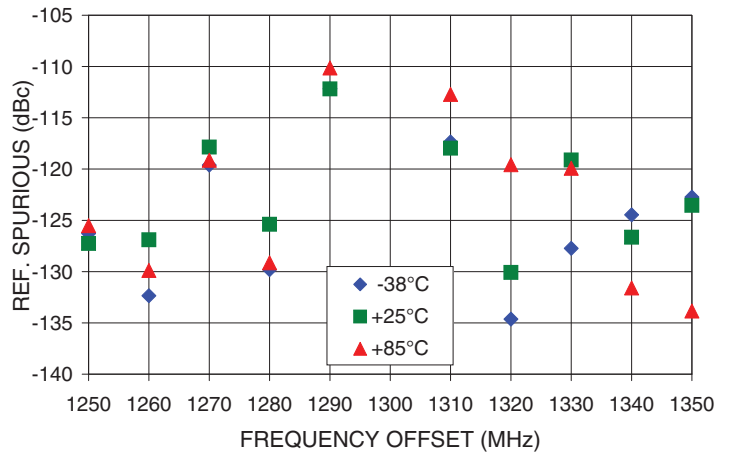
REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1100MHz



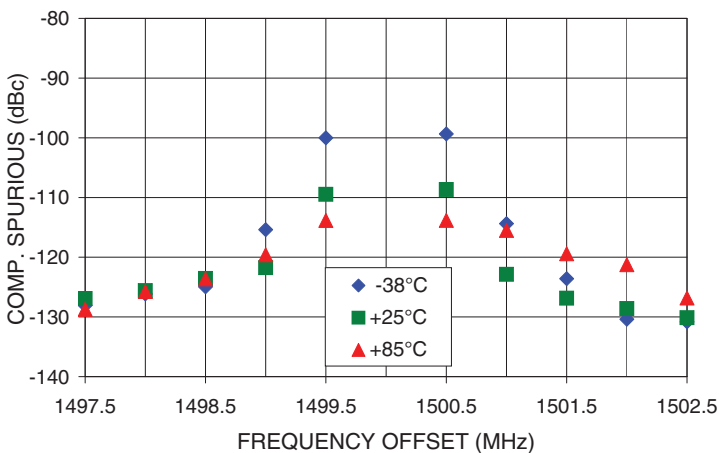
COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1300MHz



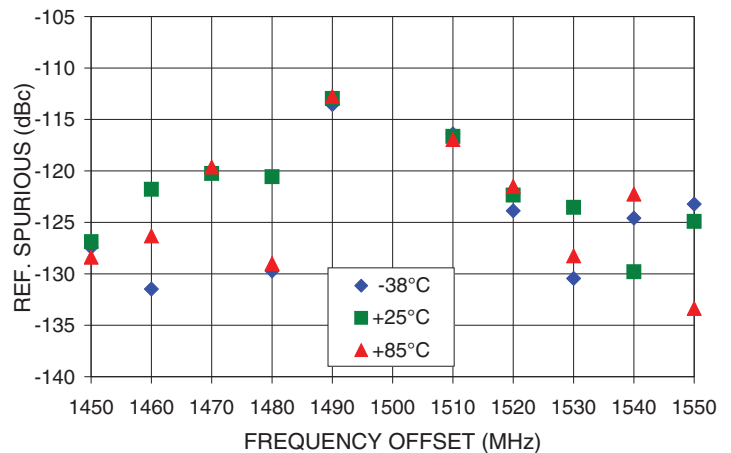
REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1300MHz



COMPARISON SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1500MHz



REFERENCE SPURIOUS
Vs FREQ. OFFSET @ Fcar = 1500MHz



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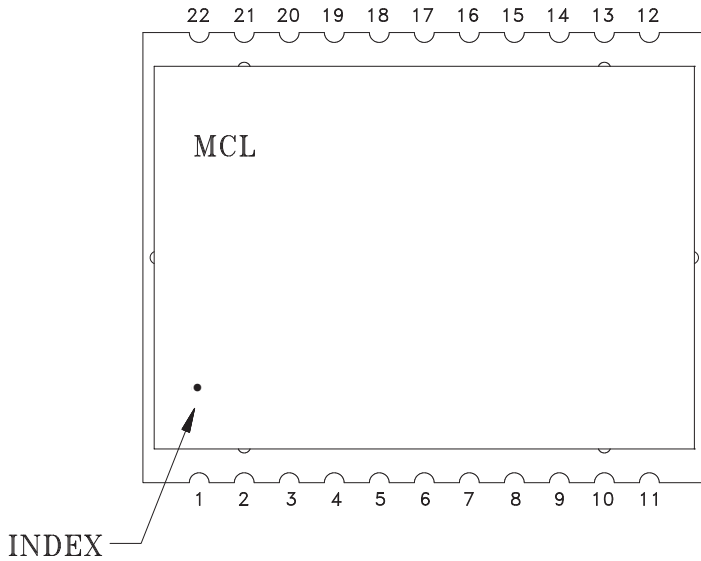
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NON-CATALOG

Frequency Synthesizer

DSN-1500A-1119+

Pin Configuration

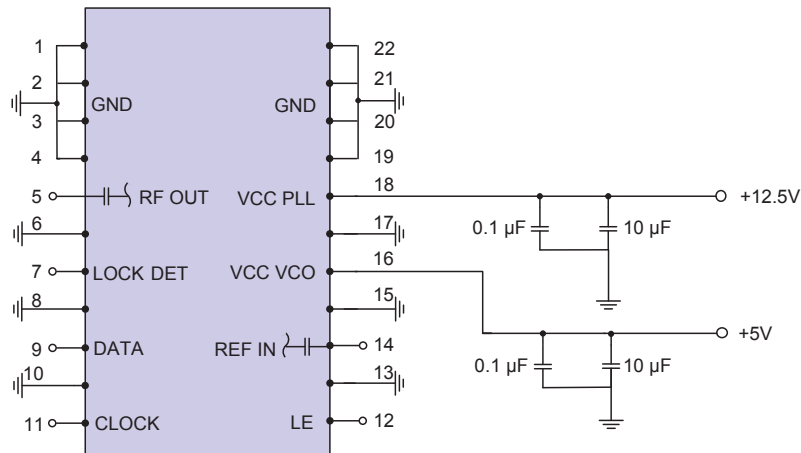


Pin Connection

Pin Number	Function	Pin Number	Function
1	GND	12	LE
2	GND	13	GND
3	GND	14	REF IN
4	GND	15	GND
5	RF OUT	16	VCC VCO
6	GND	17	GND
7	LOCK DET	18	VCC PLL
8	GND	19	GND
9	DATA	20	GND
10	GND	21	GND
11	CLOCK	22	GND

Recommended Application Circuit

Note: REF IN and RF OUT ports are internally AC coupled.



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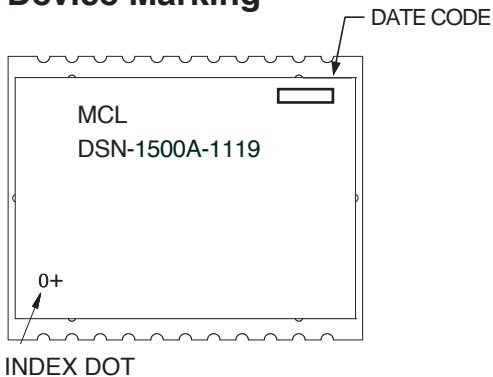


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Device Marking



Additional Detailed Technical Information

Additional information is available on our web site. To access this information enter the model number on our web site home page.

Case Style: KL942

Tape & Reel: TR-F97

Suggested Layout for PCB Design: PL-318

Evaluation Board: TB-553+

Environment Ratings: ENV03T2



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